



# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005



Job No.: CTCE/BBMP/W.No.14/GNR/WMM/Gradation/2014-15

## GRADATION FOR WMM MORTH TABLE-400-11



Customer : Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.

Agency : Mr. G.N. Ramesh,

No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.

Name of Work : Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore.

Reference : EE/DD/WO/299/2014-15 Dated: 16.03.2015

Date of Testing : 18.03.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 7780

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 250                  | 250                             | 3.2                      | 96.8                    | 95-100      |
| 22.4                | 2250                 | 2500                            | 32.1                     | 67.9                    | 60-80       |
| 11.2                | 1205                 | 3705                            | 47.6                     | 52.4                    | 40-60       |
| 4.75                | 1150                 | 4855                            | 62.4                     | 37.6                    | 25-40       |
| 2.36                | 985                  | 5840                            | 75.1                     | 24.9                    | 15-30       |
| 0.600               | 900                  | 6740                            | 86.6                     | 13.4                    | 8-22        |
| 0.075               | 680                  | 7420                            | 95.4                     | 4.6                     | 0-8         |

Note:

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Bangalore, 560021  
Bangalore

M/s. Civil-Tech Consultants & Engineers  
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4th Block, Shakti Ganapathinagara,  
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Agency : Mr. G.N. Ramesh,

No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.

Name of Work : Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore.

Reference : EE/DD/WO/299/2014-15 Dated: 16.03.2015

Date of Testing : 18.03.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 7885

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 215                  | 215                             | 2.7                      | 97.3                    | 95-100      |
| 22.4                | 2505                 | 2720                            | 34.5                     | 65.5                    | 60-80       |
| 11.2                | 1310                 | 4030                            | 51.1                     | 48.9                    | 40-60       |
| 4.75                | 1000                 | 5030                            | 63.8                     | 36.2                    | 25-40       |
| 2.36                | 925                  | 5955                            | 75.5                     | 24.5                    | 15-30       |
| 0.600               | 895                  | 6850                            | 86.9                     | 13.1                    | 8-22        |
| 0.075               | 800                  | 7650                            | 97.0                     | 3.0                     | 0-8         |

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*(Handwritten signature and stamp)*  
MORTH TABLE-400-11  
Gradation for WMM  
BBMP, Bangalore

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Job No.: CTCF/BBMP/W.No.14/GNR/WAM/AIV/2014-15

18.03.2015

## Aggregate Impact Value

IS: 2386 Part IV

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Source / Location | WMM Plant                                                                                                   |
| Type of Mix       | Wet Mix macadam                                                                                             |
| Date of Testing   | 18.03.2015                                                                                                  |



## Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

## Note:

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M/s. Civil-Tech Consultants & Engineers



| SI No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 378       | 379   | 20.74   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 78        | 79    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 300       | 300   |         |
| 4      | Aggregate Impact value = percent fines                                     | 20.63     | 20.84 |         |
|        | $100 * (W_2/W_1) \%$                                                       |           |       |         |



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Job No.: CTCF/BBMP/W.No.14/KRIDL/WAM/S-T/2014-15 18.03.2015

**DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES**

|                     |                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------|
| Client              | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                       |
| Agency              | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.             |
| Name of Work        | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | EF/DD/WO/299/2014-15 Dated: 16.03.2015                                                                        |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011)                                                                                |
| Type of Mix         | Wet Mix Macadam                                                                                               |
| Date of Testing     | 18.03.2015                                                                                                    |

Result : Flakiness Index = 12.35%

Elongation Index = 13.90%

Result : Combined Flakiness & Elongation index 26.25%

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

**Note:**

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25.03.2015

Job No.: CTCE/BBMP/W.No.14/GNR/CSR-03/794e/QB(BMD)/2014-15

**TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS**

|                   |   |                                                                                                                           |
|-------------------|---|---------------------------------------------------------------------------------------------------------------------------|
| *CUSTOMER         | : | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                                   |
| *AGENCY           | : | Mr. G.N. Ramesh,<br>No.01, 3 <sup>rd</sup> Main, Gandhi Grama, 7 <sup>th</sup> Cross, Maruthi Layout, Bangalore - 560021. |
| *NAME OF THE WORK | : | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore.             |
| REFERENCE         | : | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                                    |
| *SAMPLE ID        | : | Bitumen                                                                                                                   |
| DATE OF SAMPLING  | : | 23.03.2015                                                                                                                |
| DARE OF TESTING   | : | 25.03.2015                                                                                                                |

The results of the tests conducted on the bitumen sample.

| Sl. No | Description                   | Test Method as per IS    | Test Result | Requirement as per IS:73:2013 |
|--------|-------------------------------|--------------------------|-------------|-------------------------------|
| 1      | Penetration at 25 °C, 1/10 mm | IS :1203 -1978 (RA-2009) | 84          | 80 to 100                     |
| 2      | Softening point, °C           | IS :1205 -1978 (RA-2009) | 44          | Min. 40                       |
| 3      | Ductility at 27°C, cm         | IS :1208 -1978 (RA-2009) | 100 >       | Min. 75                       |
| 4      | Flash Point, °C               | IS :1209 -1978 (RA-2009) | 296         | Min. 220                      |

\*Information is furnished by the Customer/Representative.

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\*\*\*\*\*

**VISHWANATH.C**  
Quality Manager

Signature of Quality Manager  
Date: 25.03.2015  
Place: Bangalore



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25.03.2015

Job No: CTCF/BBMP/W.No.14/GNR/BM/AIV/2014-15

**Aggregate Impact Value**  
IS: 2386 Part IV

|                   |                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                       |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.             |
| Name of the Work  | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                        |
| Source / Location | Hotmix Plant, Bangalore                                                                                       |
| Type of Mix       | Bituminous Macadam                                                                                            |
| Date of Testing   | 25.03.2015                                                                                                    |



| SI No. | Details                                                                    |       | Trial No. |   | Average |
|--------|----------------------------------------------------------------------------|-------|-----------|---|---------|
|        |                                                                            |       | 1         | 2 |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 385   | 386       |   |         |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 85    | 86        |   |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 300   | 300       |   |         |
| 4      | Aggregate Impact value = percent fines                                     | 22.08 | 22.28     |   |         |
|        | $100 * (W_2/W_1) \%$                                                       |       |           |   | 22.18   |

**Comments:**

→ Maximum allowable Aggregate Impact value for Bituminous Macadam is 30%

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Job No: CTCE/BBMP/W.No.14/GNR/BM/Shape.T/2014-15 : 25.03.2015

**DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE**

**AGGREGATES**

|                     |                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------|
| Customer            | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency              | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of Work        | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | EF/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011)                                                                              |
| Type of Mix         | Bituminious Macadam                                                                                         |
| Date of Testing     | 25.03.2015                                                                                                  |

Flakiness Index = 12.32%

Elongation Index = 13.65%

Result : Combined Flakiness & Elongation index

25.97%

**Comments:**

→ Maximum allowable Flakiness & Elongation Index for Bituminous Macadam is 30%

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 Bangalore-560079.

*(Signature)*  
 Director,  
 Bangalore, 25-03-2015  
 25.03.2015



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Job No: CTCE/BBMP/W.No.14/GNR/BM/Stripping/2014-15 26.03.2015

**Stripping Value of Road Aggregates (Static Immersion Test)**

IS: 6241

|                  |                                                                                                                  |
|------------------|------------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                          |
| Agency           | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.                |
| Name of the work | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward<br>No.14, Bagalagunte, BBMP, Bangalore. |
| Reference        | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                           |
| Type of Mix      | Bituminous Macadam                                                                                               |
| Date of Testing  | 26.03.2015                                                                                                       |

Type of binder : 80/100  
Percentage of binder used : 5.0% by wt.  
Total weight of aggregate : 200 g  
Total weight of binder : 10.0 g  
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|--------------------|-----------------------|---------------------|-----------------------------|
| 1                  | 3.3                   | 3.40                | 96.60                       |
| 2                  | 3.4                   |                     |                             |
| 3                  | 3.5                   |                     |                             |

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Macadam is 95%

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Job No: CTCE/BBMP/W.No.14/GNR/BM/SP-Wa/2014-15 26.03.2015

**Specific Gravity And Water Absorption Test**  
IS: 2386 Part III

|                   |                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                       |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.             |
| Name of the Work  | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                        |
| Source / Location | Hotmix Plant, Bangalore.                                                                                      |
| Type of Mix       | Bituminous Macadam                                                                                            |
| Date of Testing   | 26.03.2015                                                                                                    |



| Sl. No. | Details                                                | Notation                    | Test Number |        |        | Mean Value |
|---------|--------------------------------------------------------|-----------------------------|-------------|--------|--------|------------|
|         |                                                        |                             | Test 1      | Test 2 | Test 2 |            |
| 1       | Weight of aggregate suspended in water with the basket | $W_1 g$                     | 2008        | 2009   | 2010   |            |
| 2       | Weight of basket suspended in water                    | $W_2 g$                     | 750         | 750    | 750    |            |
| 3       | Weight of saturated aggregate in water                 | $(W_1 - W_2) = W_s g$       | 1258        | 1259   | 1260   |            |
| 4       | Weight of saturated surface dry aggregate in air       | $W_3 g$                     | 2013        | 2014   | 2016   |            |
| 5       | Weight of water equal to the volume of the aggregate   | $(W_3 - W_s) g$             | 755         | 755    | 756    |            |
| 6       | Weight of oven dried aggregate                         | $W_4 g$                     | 1999        | 2001   | 2000   |            |
| 7       | Specific Gravity                                       | $W_4 / (W_3 - W_s)$         | 2.648       | 2.650  | 2.646  | 2.647      |
| 8       | Apparent Specific gravity                              | $W_4 / (W_4 - W_s)$         | 2.698       | 2.697  | 2.703  | 2.700      |
| 9       | Water Absorption                                       | $((W_3 - W_4) * 100) / W_4$ | 0.70%       | 0.65%  | 0.80%  | 0.75%      |

**Comments:**

→ Maximum allowable Aggregate Water absorption value for Bituminous Macadam is 2.0%

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26.03.2015

Job No: CTCE/BBMP/W.No.14/GNR/BM/Agg.G/2014-15

## Aggregate Gradation Test

IS : 2386 Part I

|                  |                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                       |
| Agency           | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.             |
| Name of the work | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference        | BE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                        |
| Sample ID        | Hotmix Plant, Bangalore.                                                                                      |
| Type of Mix      | Bituminous Macadam                                                                                            |
| Date of Testing  | 26.03.2015                                                                                                    |



Total Weight of Sample: gm

5300

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks                            |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|------------------------------------|
| 26.5           | 0                   | 0          | 0                      | 100       | 100                   | Gradation satisfies Grade-II MORTH |
| 19             | 410                 | 7.74       | 7.74                   | 92.26     | 90-100                |                                    |
| 13.2           | 1695                | 31.98      | 39.72                  | 60.28     | 56-88                 |                                    |
| 4.75           | 1655                | 31.23      | 70.94                  | 29.06     | 16-36                 |                                    |
| 2.36           | 950                 | 17.92      | 88.87                  | 11.13     | 4-19                  |                                    |
| 0.3            | 340                 | 6.42       | 95.28                  | 4.72      | 2-10                  |                                    |
| 0.075          | 95                  | 1.79       | 97.08                  | 2.92      | 0-8                   |                                    |

Total Weight of Sample: gm

5350

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks                            |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|------------------------------------|
| 26.5           | 0                   | 0          | 0                      | 100       | 100                   | Gradation satisfies Grade-II MORTH |
| 19             | 340                 | 6.36       | 6.36                   | 93.64     | 90-100                |                                    |
| 13.2           | 1765                | 32.99      | 39.35                  | 60.65     | 56-88                 |                                    |
| 4.75           | 1550                | 28.97      | 68.32                  | 31.68     | 16-36                 |                                    |
| 2.36           | 930                 | 17.38      | 85.70                  | 14.30     | 4-19                  |                                    |
| 0.3            | 410                 | 7.66       | 93.36                  | 6.64      | 2-10                  |                                    |
| 0.075          | 95                  | 1.78       | 95.14                  | 4.86      | 0-8                   |                                    |

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Job No: CTCF/BBMP/W.No.14/GNR/BM/Ag.G/2014-15

26.03.2015

**Aggregate Gradation Test**  
IS : 2386 Part I

|                  |                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                       |
| Agency           | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.             |
| Name of the work | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference        | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                        |
| Sample ID        | Hotmix Plant, Bangalore.                                                                                      |
| Type of Mix      | Bituminous Macadam                                                                                            |
| Date of Testing  | 26.03.2015                                                                                                    |

Total Weight of Sample: 5100 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|---------|
| 26.5           | 0                   | 0          | 0                      | 100       | 100                   |         |
| 19             | 250                 | 4.90       | 4.90                   | 95.10     | 90-100                |         |
| 13.2           | 1585                | 31.08      | 35.98                  | 64.02     | 56-88                 |         |
| 4.75           | 1580                | 30.98      | 66.96                  | 33.04     | 16-36                 |         |
| 2.36           | 850                 | 16.67      | 83.63                  | 16.37     | 4-19                  |         |
| 0.3            | 385                 | 7.55       | 91.18                  | 8.82      | 2-10                  |         |
| 0.075          | 150                 | 2.94       | 94.12                  | 5.88      | 0-8                   |         |

Total Weight of Sample: 5200 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|---------|
| 26.5           | 0                   | 0          | 0                      | 100       | 100                   |         |
| 19             | 325                 | 6.25       | 6.25                   | 93.75     | 90-100                |         |
| 13.2           | 1615                | 31.06      | 37.31                  | 62.69     | 56-88                 |         |
| 4.75           | 1545                | 29.71      | 67.02                  | 32.98     | 16-36                 |         |
| 2.36           | 900                 | 17.31      | 84.33                  | 15.67     | 4-19                  |         |
| 0.3            | 400                 | 7.69       | 92.02                  | 7.98      | 2-10                  |         |
| 0.075          | 125                 | 2.40       | 94.42                  | 5.58      | 0-8                   |         |

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Handwritten signature and text.

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Job No.: CTCE/BBMP/W.No.14/GNR/CSR-03/794e/QB(SDBC)/2014-15  
26.03.2015

**TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS**

|                   |   |                                                                                                                           |
|-------------------|---|---------------------------------------------------------------------------------------------------------------------------|
| *CUSTOMER         | : | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                                   |
| *AGENCY           | : | Mr. G.N. Ramesh,<br>No.01, 3 <sup>rd</sup> Main, Gandhi Grama, 7 <sup>th</sup> Cross, Maruthi Layout, Bangalore - 560021. |
| *NAME OF THE WORK | : | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore.             |
| REFERENCE         | : | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                                    |
| *SAMPLE ID        | : | Bitumen                                                                                                                   |
| DATE OF SAMPLING  | : | 24.03.2015                                                                                                                |
| DATE OF TESTING   | : | 26.03.2015                                                                                                                |

The results of the tests conducted on the bitumen sample.

| Sl. No | Description                   | Test Method as per IS    | Test Result | Requirement as per IS:73:2013 |
|--------|-------------------------------|--------------------------|-------------|-------------------------------|
| 1      | Penetration at 25 °C, 1/10 mm | IS :1203 -1978 (RA-2009) | 88          | 80 to 100                     |
| 2      | Softening point, °C           | IS :1205 -1978 (RA-2009) | 44          | Min. 40                       |
| 3      | Ductility at 27°C, cm         | IS :1208 -1978 (RA-2009) | 100 >       | Min. 75                       |
| 4      | Flash Point, °C               | IS :1209 -1978 (RA-2009) | 298         | Min. 220                      |

\*Information is furnished by the Customer/Representative.

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**VISHWANATH.C**  
Quality Manager

\*\*\*\*\*  
Signature  
Date: 26.03.2015  
Place: Bangalore



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Job No.: CTCB/BBMP/W.No.14/GNR/SDBC/AIV/2014-15

26.03.2015

**Aggregate Impact Value**

IS: 2386 Part IV

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | BE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Source / Location | Hot Mix Plant, Bangalore                                                                                    |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                              |
| Date of Testing   | 26.03.2015                                                                                                  |

| SI No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 389       | 390   | 22.34   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 88        | 86    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 301       | 304   |         |
| 4      | Aggregate Impact value = percent fines<br>$100 * (W_2/W_1)\%$              | 22.62     | 22.05 |         |

**Comments:**

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

**Note:**

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Bangalore-560079.

*(Signature)*  
Authorized sign-off  
centered, dated  
2015/03/26



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26.03.2015

Job No.: CTCE/BBMP/W.No.14/GNR/SDBC/AIV/2014-15

**Aggregate Impact Value**  
IS: 2386 Part IV

|                   |                                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                        |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.              |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14,<br>Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                         |
| Source / Location | Hot Mix Plant, Bangalore                                                                                       |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                                 |
| Date of Testing   | 26.03.2015                                                                                                     |



| SI No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 383       | 384   | 21.64   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 82        | 84    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 301       | 300   |         |
| 4      | Aggregate Impact value = percent fines<br>$100 * (W_2/W_1)\%$              | 21.41     | 21.88 |         |

**Comments:**

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Bangalore-560079.

**Accepted for testing**  
Signature: \_\_\_\_\_  
Date: \_\_\_\_\_  
Location: \_\_\_\_\_

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**Aggregate Impact Value**  
IS: 2386 Part IV

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Source / Location | Hot Mix Plant, Bangalore                                                                                    |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                              |
| Date of Testing   | 26.03.2015                                                                                                  |

| SI No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 379       | 381   | 20.66   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 78        | 79    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 301       | 302   |         |
| 4      | Aggregate Impact value = percent fines<br>$100 * (W_2/W_1)\%$              | 20.58     | 20.73 |         |

**Comments:**

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.14/GNR/SDBC/AIV/2014-15

**Aggregate Impact Value**  
IS: 2386 Part IV

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Source / Location | Hot Mix Plant, Bangalore                                                                                    |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                              |
| Date of Testing   | 26.03.2015                                                                                                  |



| SI | No. | Details                                                                    | Trial No. |       | Average |
|----|-----|----------------------------------------------------------------------------|-----------|-------|---------|
|    |     |                                                                            | 1         | 2     |         |
| 1  |     | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 385       | 386   | 22.18   |
| 2  |     | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 85        | 86    |         |
| 3  |     | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 300       | 300   |         |
| 4  |     | Aggregate Impact value = percent fines $100 * (W_2/W_1) \%$                | 22.08     | 22.28 |         |

**Comments:**

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Bangalore-560079.

*Handwritten signature and stamp:*  
"Maximum value of impact value is 27% for semi dense bituminous concrete"  
"Approved"  
"26.03.2015"



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**DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF  
COARSE AGGREGATES**

|                     |                                                                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------------------------|
| Customer            | : Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                          |
| Agency              | : Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.                |
| Name of Work        | : Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward<br>No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | : EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                           |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007)                                                                                   |
| Type of Mix         | : Semi Dense Bituminous Concrete                                                                                   |
| Date of Testing     | : 26.03.2015                                                                                                       |

Result : Flakiness Index = 11.23%

Elongation Index = 13.25%

Result : Combined Flakiness & Elongation index

24.48%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Job No.: CTCE/BBMP/W.No.14/GNR/SDBC/Shape\_T/2014-15 : 26.03.2015

**DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF  
COARSE AGGREGATES**

|                     |                                                                                                                  |
|---------------------|------------------------------------------------------------------------------------------------------------------|
| Customer            | : Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                        |
| Agency              | : Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.              |
| Name of Work        | : Improvements drains & Re- Asphaltng to roads at Defence Colony in Ward<br>No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | : EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                         |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007)                                                                                 |
| Type of Mix         | : Semi Dense Bituminous Concrete                                                                                 |
| Date of Testing     | : 26.03.2015                                                                                                     |

Result : Flakiness Index = 12.35%

Elongation Index = 13.90%

Result : Combined Flakiness & Elongation index

26.25%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Basaveshwaranagar, Bangalore-560079.

Accepted  
Marked, tested  
Standard test report  
26.03.2015

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Job No.: CTCF/BBMP/W.No.14/GNR/SDBC/Shape\_T/2014-15 : 26.03.2015

**DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF  
COARSE AGGREGATES**

|                     |                                                                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------------------------|
| Customer            | : Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                          |
| Agency              | : Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.                |
| Name of Work        | : Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward<br>No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | : EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                           |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007)                                                                                   |
| Type of Mix         | : Semi Dense Bituminous Concrete                                                                                   |
| Date of Testing     | : 26.03.2015                                                                                                       |

Result : Flakiness Index = 11.05%

Elongation Index = 13.25%

Result : Combined Flakiness & Elongation index

24.30%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Bangalore-560079.

Received  
16.03.2015  
11:00 AM  
Bangalore



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Job No.: CTCE/BBMP/W.No.14/GNR/SDBC/Shape-T/2014-15 : 26.03.2015

**COARSE AGGREGATES**

|                     |                                                                                                                  |
|---------------------|------------------------------------------------------------------------------------------------------------------|
| Customer            | : Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                        |
| Agency              | : Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore – 560021.              |
| Name of Work        | : Improvements drains & Re- Asphaltng to roads at Defence Colony in Ward<br>No.14, Bagalagunte, BBMP, Bangalore. |
| Reference           | : EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                         |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007)                                                                                 |
| Type of Mix         | : Semi Dense Bituminous Concrete                                                                                 |
| Date of Testing     | : 26.03.2015                                                                                                     |

Result : Flakiness Index = 12.35%

$$\text{Elongation Index} = 13.90\%$$

Result : Combined Flakiness & Elongation index

26.25%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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*[Handwritten signature]*





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27.03.2015

Job No.: CTCE/BBMP/W.No.14/GNR/SDBC/Sp\_Wa/2014-15

**Specific Gravity And Water Absorption Test**

IS: 2386 Part III

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency            | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work  | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference         | BE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                              |
| Source / Location | Hotmix Plant, Bangalore                                                                                     |
| Date of Testing   | 27.03.2015                                                                                                  |



| Sl. No. | Details                                                | Notation                    | Test Number |        |        | Mean Value |
|---------|--------------------------------------------------------|-----------------------------|-------------|--------|--------|------------|
| 1       | Weight of aggregate suspended in water with the basket | $W_1 g$                     | Test 1      | Test 2 | Test 3 |            |
| 2       | Weight of basket suspended in water                    | $W_2 g$                     |             |        |        |            |
| 3       | Weight of saturated aggregate in water                 | $(W_1 - W_2) = W_s g$       |             |        |        |            |
| 4       | Weight of saturated surface dry aggregate in air       | $W_3 g$                     |             |        |        |            |
| 5       | Weight of water equal to the volume of the aggregate   | $(W_3 - W_s) g$             |             |        |        |            |
| 6       | Weight of oven dried aggregate                         | $W_4 g$                     |             |        |        |            |
| 7       | Specific Gravity                                       | $W_4 / (W_3 - W_s)$         |             |        |        |            |
| 8       | Apparent Specific gravity                              | $W_4 / (W_4 - W_s)$         |             |        |        |            |
| 9       | Water Absorption                                       | $((W_3 - W_4) * 100) / W_4$ |             |        |        |            |

**Comments:**

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%  
Note:

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005



Job No.: CTCF/BBMP/W.No.14/GNR/SDBC/AGG/2014-15

27.03.2015

## Aggregate Gradation Test

IS : 2386 Part I

|                  |                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency           | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work | Improvements drains & Re-Asphalting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference        | FE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Sample I / D     | Hot Mix Plant, Bangalore                                                                                    |
| Type of Mix      | Semi Dense Bituminous Concrete (SDBC)                                                                       |
| Date of Testing  | 27.03.2015                                                                                                  |

Total Weight of Sample: 5200 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cumulative % Retained | % Passing | Grade-II As per MORTH | Remarks                            |
|----------------|---------------------|------------|-----------------------|-----------|-----------------------|------------------------------------|
| 13.2           | 0                   | 0.0        | 0                     | 100       | 100                   | Gradation satisfies Grade-II MORTH |
| 9.5            | 315                 | 6.1        | 6.06                  | 93.94     | 90-100                |                                    |
| 4.75           | 2650                | 51.0       | 57.02                 | 42.98     | 35-51                 |                                    |
| 2.36           | 685                 | 13.2       | 70.19                 | 29.81     | 24-39                 |                                    |
| 1.18           | 645                 | 12.4       | 82.60                 | 17.40     | 15-30                 |                                    |
| 0.3            | 340                 | 6.5        | 89.13                 | 10.87     | 9-19                  |                                    |
| 0.075          | 300                 | 5.8        | 94.90                 | 5.10      | 3-8                   |                                    |

Total Weight of Sample: 5300 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cumulative % Retained | % Passing | Grade-II As per MORTH | Remarks                            |
|----------------|---------------------|------------|-----------------------|-----------|-----------------------|------------------------------------|
| 13.2           | 0                   | 0.0        | 0                     | 100       | 100                   | Gradation satisfies Grade-II MORTH |
| 9.5            | 365                 | 6.9        | 6.89                  | 93.11     | 90-100                |                                    |
| 4.75           | 2505                | 47.3       | 54.15                 | 45.85     | 35-51                 |                                    |
| 2.36           | 690                 | 13.0       | 67.17                 | 32.83     | 24-39                 |                                    |
| 1.18           | 485                 | 9.2        | 76.32                 | 23.68     | 15-30                 |                                    |
| 0.3            | 390                 | 7.4        | 83.68                 | 16.32     | 9-19                  |                                    |
| 0.075          | 480                 | 9.1        | 92.74                 | 7.26      | 3-8                   |                                    |

Note:

This test report should not be reproduced except in full, without written approval of the laboratory.  
The results indicated above are based on the tests carried out on the samples received in the laboratory.  
Any Query regarding the report must be reported within 30 days from the date of testing.

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27.03.2015

## Aggregate Gradation Test

IS : 2386 Part I

|                  |                                                                                                             |
|------------------|-------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                     |
| Agency           | Mr. G.N. Ramesh,<br>No.01, 3rd Main, Gandhi Grama, 7th Cross, Maruthi Layout, Bangalore - 560021.           |
| Name of the Work | Improvements drains & Re- Asphalted to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore. |
| Reference        | BE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                      |
| Sample I / D     | Hot Mix Plant, Bangalore                                                                                    |
| Type of Mix      | Semi Dense Bituminous Concrete (SDBC)                                                                       |
| Date of Testing  | 27.03.2015                                                                                                  |



Total Weight of Sample: 5100 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|---------|
| 13.2           | 0                   | 0.0        | 0                      | 100       | 100                   |         |
| 9.5            | 300                 | 5.9        | 5.88                   | 94.12     | 90-100                |         |
| 4.75           | 2585                | 50.7       | 56.57                  | 43.43     | 35-51                 |         |
| 2.36           | 660                 | 12.9       | 69.51                  | 30.49     | 24-39                 |         |
| 1.18           | 625                 | 12.3       | 81.76                  | 18.24     | 15-30                 |         |
| 0.3            | 335                 | 6.6        | 88.33                  | 11.67     | 9-19                  |         |
| 0.075          | 315                 | 6.2        | 94.51                  | 5.49      | 3-8                   |         |

Total Weight of Sample: 5150 gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | Grade-II As per MORTH | Remarks |
|----------------|---------------------|------------|------------------------|-----------|-----------------------|---------|
| 13.2           | 0                   | 0.0        | 0                      | 100       | 100                   |         |
| 9.5            | 345                 | 6.7        | 6.70                   | 93.30     | 90-100                |         |
| 4.75           | 255                 | 5.0        | 11.65                  | 88.35     | 35-51                 |         |
| 2.36           | 685                 | 13.3       | 24.95                  | 75.05     | 24-39                 |         |
| 1.18           | 490                 | 9.5        | 34.47                  | 65.53     | 15-30                 |         |
| 0.3            | 395                 | 7.7        | 42.14                  | 57.86     | 9-19                  |         |
| 0.075          | 485                 | 9.4        | 51.55                  | 48.45     | 3-8                   |         |

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Job No.: CTCB/BBMP/W.No.14/KRIDL/SDBC/Stability/2014-15 27.03.2015

## TEST REPORT ON STABILITY OF MIX

|                    |   |                                                                                                                           |
|--------------------|---|---------------------------------------------------------------------------------------------------------------------------|
| Client             | : | Asst. Executive Engineer, T. Dasarahalli Sub Division, BBMP, Bangalore.                                                   |
| Agency             | : | Mr. G.N. Ramesh,<br>No.01, 3 <sup>rd</sup> Main, Gandhi Grama, 7 <sup>th</sup> Cross, Maruthi Layout, Bangalore - 560021. |
| Name of the Work   | : | Improvements drains & Re- Asphaltting to roads at Defence Colony in Ward No.14, Bagalagunte, BBMP, Bangalore.             |
| Reference          | : | EE/DD/WO/299/2014-15 Dated: 16.03.2015                                                                                    |
| Source of location | : | Hot mix Plant, Bangalore                                                                                                  |
| Type of Mix        | : | Semi Dense Bituminous Concrete                                                                                            |
| Date of Testing    | : | 27.03.2015                                                                                                                |

The results of the tests conducted on the bituminous concrete mix sample are as follows:

| Sl. No | Description                            | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-16) |
|--------|----------------------------------------|---------------|---------------|-----------------------------------------|
| 1      | Marshal Stability, Kn                  | 8.65          | 8.95          | 8.2 Kn (min)                            |
| 2      | Marshal flow, mm                       | 3.05          | 3.20          | 2 - 4                                   |
| 3      | Percent air voids in Mineral Aggregate | 3.85          | 4.10          | 3 - 5                                   |
| 4      | Voids in Compacted Mix                 | 13.50         | 14.05         | 13 - 15                                 |
| 5      | Percent Voids filled with Bitumen      | 66.85         | 69.20         | 65 - 78                                 |
| 6      | Density, g/cc                          | 2.26          | 2.27          | --                                      |

Note:

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*(Signature)*  
M. Dasarahalli Sub Division  
Bangalore, 2015